

**§ 23.1047 Cooling test procedures for reciprocating engine powered airplanes.**

Compliance with § 23.1041 must be shown for the climb (or, for multien-gine airplanes with negative one-en-gine-inoperative rates of climb, the de-scent) stage of flight. The airplane must be flown in the configurations, at the speeds and following the procedures recommended in the Airplane Flight Manual, that correspond to the appli-cable performance requirements that are critical to cooling.

[Amdt. 23-51, 61 FR 5137, Feb. 9, 1996]

## LIQUID COOLING

**§ 23.1061 Installation.**

(a) *General.* Each liquid-cooled engine must have an independent cooling sys-tem (including coolant tank) installed so that—

(1) Each coolant tank is supported so that tank loads are distributed over a large part of the tank surface;

(2) There are pads or other isolation means between the tank and its sup-ports to prevent chafing.

(3) Pads or any other isolation means that is used must be nonabsorbent or must be treated to prevent absorption of flammable fluids; and

(4) No air or vapor can be trapped in any part of the system, except the coolant tank expansion space, during filling or during operation.

(b) *Coolant tank.* The tank capacity must be at least one gallon, plus 10 per-cent of the cooling system capacity. In addition—

(1) Each coolant tank must be able to withstand the vibration, inertia, and fluid loads to which it may be sub-jected in operation;

(2) Each coolant tank must have an expansion space of at least 10 percent of the total cooling system capacity; and

(3) It must be impossible to fill the expansion space inadvertently with the airplane in the normal ground attitude.

(c) *Filler connection.* Each coolant tank filler connection must be marked as specified in § 23.1557(c). In addition—

(1) Spilled coolant must be prevented from entering the coolant tank com-partment or any part of the airplane other than the tank itself; and

(2) Each recessed coolant filler con-nection must have a drain that dis-charges clear of the entire airplane.

(d) *Lines and fittings.* Each coolant system line and fitting must meet the requirements of § 23.993, except that the inside diameter of the engine coolant inlet and outlet lines may not be less than the diameter of the corresponding engine inlet and outlet connections.

(e) *Radiators.* Each coolant radiator must be able to withstand any vibra-tion, inertia, and coolant pressure load to which it may normally be subjected. In addition—

(1) Each radiator must be supported to allow expansion due to operating temperatures and prevent the trans-mittal of harmful vibration to the radi-ator; and

(2) If flammable coolant is used, the air intake duct to the coolant radiator must be located so that (in case of fire) flames from the nacelle cannot strike the radiator.

(f) *Drains.* There must be an acces-sible drain that—

(1) Drains the entire cooling system (including the coolant tank, radiator, and the engine) when the airplane is in the normal ground altitude;

(2) Discharges clear of the entire air-plane; and

(3) Has means to positively lock it closed.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-43, 58 FR 18973, Apr. 9, 1993]

**§ 23.1063 Coolant tank tests.**

Each coolant tank must be tested under § 23.965, except that—

(a) The test required by § 23.965(a)(1) must be replaced with a similar test using the sum of the pressure devel-oped during the maximum ultimate ac-celeration with a full tank or a pres-sure of 3.5 pounds per square inch, whichever is greater, plus the max-imum working pressure of the system; and

(b) For a tank with a nonmetallic liner the test fluid must be coolant rather than fuel as specified in § 23.965(d), and the slosh test on a speci-men liner must be conducted with the coolant at operating temperature.